AN ESSAY UPON THE WITHAM SPA.

Or, A brief ENQUIRY into the NATURE, VIRTUES, and USES OF A Mineral Chalybeate Water AT *WITHAM* in *ESSEX*.

WHEREIN

The Mineral Subſtances through which it paſſes, and the Impregnating Principles thereof are diſtinctly conſidered; the Water itſelf Analytically examined; and its ſeveral Component Parts, with their Effects upon a Human Body, ſeparately demonſtrated: From whence the Nature of the SPA, and its Excellency in many Diſeaſes, are conſequently deduced.

By *JAMES TAVERNER*, M. B. late of
Clare-Hall, *Cambridge*.

> *Deus ter Opt. Max. in Aquis ſummas & excellentiſſimas recondidit Vires Salutares, quarum tanta eſt Præſtantia, ut longè multumque omnibus aliis Remediorum generibus ſint ſuperiores.*
>
> HOFFMAN.

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TO

Dr. *JOHN HOLLINGS*,

One of the

PHYSICIANS in Ordinary to His MAJESTY,

AND

Fellow of the Royal Society.

SIR,

AS the following Treatiſe was deſigned to give the Publick an Account of a Mineral Water not yet ſufficiently known, I thought I could no where ſo properly addreſs it as to Yourſelf; eſpecially ſince I have all the Reaſon in the world to believe, that any Endeavour to promote Natural Knowledge would meet with a favourable Reception from You. Your great Eminence in your Profeſſion, indeed, might juſtly deter me from offering ſo ſlender a Performance to one of the firſt Phyſicians in *England*, if your Candour were not as diſtinguiſhing a Part of your Character as your Knowledge. 'Tis this Conſideration encourages me to hope, that as your penetrating Judgment cannot fail to obſerve, your Goodneſs will encline You to pardon, the many Defects and Imperfections of the enſuing Treatiſe. And if I have herein contributed any thing, either towards your Amuſement at a leiſure Hour; or am ſo happy, as to have given You any, tho' but a ſlight, Inſight into the Nature of the WITHAM SPA; I ſhall be abundantly ſatisfied, and think my Time and Labour well beſtowed. I am, with great Reſpect,

SIR,

Your moſt Obliged and

Moſt Obedient Servant,

WITHAM,
Auguſt 1. 1737.

JAMES TAVERNER.

PREFACE.

IN the enſuing Diſcourſe I have endeavour'd to give as diſtinct and methodical an Account as I was able of an excellent Mineral Water, which, if more known, would be more generally admired. The Experiments (for good Part of which I thankfully acknowledge my ſelf indebted to my Friend, the ingenious Dr LEGGE *of* BRAINTREE) *I have endeavoured to deliver with ſuch Plainneſs and Perſpicuity, that any Perſon who pleaſed might be convinced of the Truth of them, by repeating them himſelf. They are indeed but few; but were ſelected out of a much greater Number, all of which I thought it needleſs to trouble the Reader with; being of Opinion, that a ſingle Experiment, if concluſive, and ſufficient to prove the Matter alledg'd, is of as much Weight as a thouſand. The Inferences made from them, and the Reaſonings concerning the Operations and Effects of the ſeveral Mineral Subſtances upon a human Body, will, I hope, be thought agreeable to Truth and the preſent Practice of Phyſick: If any Perſon think otherwiſe, and will candidly endeavour to convince me of any Miſtake herein, I will, upon* *ſufficient Reaſons for it, readily retract my Opinion: And ſhall be glad, if the ſlight Hints here given may encourage ſome abler Pen to give a fuller and more ſatisfactory Account of this excellent Water, which, both from Reaſon, and ſome Experience of its Virtues, I am thoroughly convinced it deſerves. I am ſenſible, that ſome Hiſtories of Caſes wherein our Mineral Water has proved ſucceſsful, annexed to this Diſcourſe, would have been agreeable to ſome Perſons into whoſe Hands it may chance to fall: But, tho' we are not deſtitute of ſeveral Inſtances of this kind, yet ſince the Water is yet but in its Infancy, and Examples of its good Effects will be continually multiplying; as Hiſtories of Caſes would ſwell this Treatiſe beyond its intended Compaſs; and as I may probably hereafter (if this Eſſay ſhould meet with a favourable Reception) give the Publick a farther Account of the Virtues and Efficacy of this Mineral Water, collected from farther Obſervations; I hope my Readers will excuſe me, if I defer it for the preſent; aſſuring them in the mean Time, in general, that, in hectick Fevers; in Conſtitutions debilitated by long Illneſſes; in Lowneſs of Spirits from a general Relaxation of the Solids; in Weak-*

neſs of the Nerves; in Want of Appetite, and Indigeſtion; in habitual Colick and Vomiting; in Obſtructions of ſeveral kinds; in Agues; in the Jaundice and beginning Dropſy; in Nephritick Diſorders; in ſome Aſthmatick, and ſeveral Scorbutick Caſes; and many others, too tedious to mention here, the WITHAM SPA *has been already uſed with great Benefit and Succeſs: But what makes it of leſs general extenſive Uſe, is, that the Mineral Spirit is of ſo exceeding volatile a Nature, as to make its Eſcape upon Carriage, tho' the Bottles are ever ſo carefully cork'd and cemented; whence it becomes neceſſary for thoſe, who would drink it to Advantage, to come to the Spring, and take it upon the Spot: This Property indeed prevents it from being ſent to any Diſtance; and it may, poſſibly, on that account, be ſomething longer before the Publick can be experimentally convinc'd of its Goodneſs; but as this proceeds from the Subtlety and Volatility of its Spirit, I leave it to the Gentlemen of the Faculty to determine, whether this may not rather be eſteemed a Perfection in the Water, than the contrary. I could alledge ſome Reaſons in Favour of the former Opinion; but as I think them obvious,* *and that I may not draw out this Preface to a greater Length, I ſhall, at preſent, forbear.*

To conclude; I muſt entreat my Reader's Pardon for whatever he ſhall find amiſs in this Treatiſe; I am not ſo partial to myſelf, as to be inſenſible of the many Faults and Imperfections in it, for

Dum relego, ſcripſiſſe pudet, quia plurima cerno,
Me quoque, qui feci, judice, digna lini.

Yet if, in accounting for the Production of the Mineral Water and its Spirit, for the Symptoms of Diſeaſes herein mentioned and their Cures, I am ſo fortunate as to hit upon the Truth, and thereby to give Satisfaction to the intelligent Reader, I ſhall fully obtain my Deſire: If not, I muſt take the Liberty of applying to him the Words of an excellent Poet:

———Si quid noviſti rectius iſtis,
Candidus imperti, ſi non, his utere mecum.

AN ESSAY UPON THE *WHITHAM* SPA.

CHAP. I.

Of the Town of WITHAM. *The Situation of the Mineral Spring. The Strata where it riſes.*

WITHAM is a ſmall Market Town in the County of ESSEX; diſtant from LONDON about thirty five Miles; from *Chelmsford*, ſeven; from *Maldon*, five; from *Braintree*, ſeven; and from *Colcheſter*, twelve. It is pleaſantly ſituated upon a riſing Hill, enjoys all the Advantages of a ſerene wholeſome Air and good Water, that can be wiſhed for in a

Country Town; and is, for Neatneſs, inferior to none of its Bigneſs. It is plentifully ſupply'd with Fiſh and Wild-Fowl from *Maldon*, *Colcheſter*, and the reſt of the neighbouring Sea-Ports; as the Market is always repleniſhed with the beſt of Meat and other Proviſions from the adjacent Country. Being a very great Thoroughfare, and almoſt in the Center of the County, it frequently gives Entertainment to ſeveral of the Nobility and Gentry from *Norfolk*, *Suffolk*, *Ipſwich*, *Harwich*, *Colcheſter*; and is conſequently provided of proper Accommodations for all Sorts of People. Stage-Coaches, and the Poſt, are every Day paſſing and repaſſing through it; this Town being ſeated nearly in the Mid-Way between LONDON and *Harwich*, upon a Road of about ſixty Miles in Length, which is juſtly reputed one of the fineſt in *England*.

The SPA, which is the Subject of the enſuing Diſcourſe, is three Quarters of a Mile diſtant from the Town; it ariſes on the Side of a gentle Aſcent, and cloſe to a fine Avenue of Lime-Trees which extends from WITHAM-PLACE, the Seat of the worthy and much honoured SIR EDWARD SOUTHCOTT, to the Road leading to *Falkborne*; being near half a Mile in Length. The Spring-Head lies twelve Feet lower than the Surface of the Ground that immediately ſurrounds it. The Spring was firſt diſcovered about forty Years ago: But by digging the Well too near the Verge of the Mineral *Stratum*, and where it was extremely thin; by making the Reſervoir too large; and by admitting into it, through Inadvertency, a Spring of common freſh Water, the SPA ſoon loſt its Reputation, (for it had been much eſteemed even before it was formed into a regular Well) and by Degrees grew into Diſrepute. It had been, for ſeveral Years, entirely neglected; but in the Year 1736 was again revived: And by carefully avoiding thoſe Miſtakes which evidently occaſioned the Ruin of the former Well, it is now fixed to a much better Advantage.

In digging for this Mineral Spring, the following *Strata* of the Earth were obſervable.

vable. Firſt, the common Earth or Corn-Mould; next a ſtrong Loam about four Feet in Thickneſs; then the ſame Loam, mixt with Gravel, about three Feet; after this, common Gravel likewiſe about three Feet deep; then a thin tough *variegated Stratum*, compoſed of ſeveral *Lamellæ* of different Colours, as Brown, Reddiſh Brown, Yellow, Blue; this *Stratum*, when firſt taken up, emits an exceeding ſtrong and ſtinking Smell of Sulphur and Iron; and when freſh, being infuſed in common Water, communicates to it a ferrugineous Taſte and Smell, as likewiſe the Power of tinging with Galls; but the *Stratum*, in leſs than twenty four Hours, loſes its ſulphurous Smell, as well as its Power of imparting its chalybeate Properties to common Water: This *Stratum* is about two Inches in Thickneſs, and ſeparates the common Gravel from that wherein the Spring riſes, which is a blueiſh Gravel mixed with Sand and an infinite Number of ſmall white Stones: This laſt gravelly *Stratum* likewiſe ſmells ſtrongly of Sulphur and Iron, and is of an uncertain

Thickneſs: In digging the laſt Mineral Well, it was penetrated above four Feet, but the Bottom of it was not found.

CHAP. II.

Of the Mineral Subſtances, and their component Principles.

THE two moſt remarkable Subſtances amongſt which the Mineral Water ariſes, are, the *Iron-Stones* found in great Plenty amongſt the Gravel where the Spring firſt ſhows itſelf; and the thin *variegated Stratum* before ſpoken of. Theſe *Mineral Stones* are found of ſeveral Colours, as Green, Grey, Blue, White: Upon Experiment, they appear to contain, Iron, Sulphur, Salt, and a conſiderable Quantity of an earthy or ſtony Matter: Some of them, eſpecially the blueiſh Sort, are ſo rich in Iron, that being only powdered and applied to the Magnet, without any previous Calcination, many Particles thereof are readily and briſkly attracted by it. The *variegated Stratum* contains Iron, Sulphur, Marine Salt, Nitre, and a large Proportion of a ſmooth Bolar Earth: The firſt of theſe is found by calcining the *Stratum*, after which the Magnet will attract ſeveral of its Particles; the ſecond appears from the ſtrong fætid Smell of Sulphur it emits when firſt taken out of the Ground, and from its communicating, to common Water, a Property of turning Black with Solution of Silver; but, what is yet a ſtronger Proof, and amounts to a Demonſtration, is, that a true Sulphur may by Art be ſeparated from it: The third and fourth are extracted from it in their diſtinct and proper Chryſtals, by repeated Infuſions of the powdered *Stratum* in warm Water, Filtration, Evaporation, and Chryſtallization; the Earth always remains after the Extraction of the Salts; and by its fermenting violently with Oil of Vitriol, and other Acids, appears to be Alcaline.

CHAP. III.

Of the Mineral Water; and ſome extemporaneous Trials upon it.

THE Spring riſes perpendicularly into a ſmall Receptacle, and is brought up by a Pump; the Water, when freſh, being perfectly limpid and clear. It has a very ſtrong ferrugineous Smell and Taſte; and tho' it wants that peculiar briſk and picquant Taſte, from whence perhaps chalybeate Waters might obtain the Appellation of *Acidulæ*, yet is it not deſtitute of a Spirit, which manifeſts itſelf in a certain remarkable Freſhneſs, and makes the Water very agreeable to the Palate and Stomach, as the Loſs of it renders it diſagreeable to both. It has beſides, a particular Taſte, much eaſier diſtinguiſhed by the Palate, than deſcribed; proceeding probably from the Salts or Sulphur it contains, or being perhaps the joint Effect of both. If ſuffered to ſtand ſome Time expoſed to the Air, it grows vapid and milky, a variegated

Scum ariſes upon its Surface, and at length depoſiting a browniſh Sediment, it loſes its chalybeate Taſte, and its Power of Tinging with Galls. Six Ounces of the Water, when freſh, is changed into the deepeſt Purple imaginable by leſs than half a Grain of Gall; with Syrup of Violets it turns Green; is thick, white, and precipitates a Sediment, with Solution of Silver, which in ſtanding turns Black: And from hence might be ſuppoſed to be an alcaline, ſulphurous, chalybeate Water; as the following Analyſis and Experiments will more fully evince.

CHAP. IV.

The Analyſis of the WITHAM SPA. *Some Experiments relating to it: With ſome ſhort occaſional Remarks thereupon.*

EXPERIMENT I.

A Sufficient Quantity of the WITHAM SPA, freſh from the Pump, was put into a clean Glaſs Retort, which being joined to a Receiver by a Lute capable of retaining the moſt ſubtle Vapour, the aqueous Part was drawn over by a gentle Heat in Sand, which by many Trials appeared not the leaſt different from common diſtill'd Water. In the Retort remained a dry, yellowiſh, brown, ſaline Subſtance.

This Experiment ſhews how vain a Thing it is, to endeavour to catch the Volatile Spirit of a Mineral Chalybeate Water by Diſtillation: And in this all the Writers upon this Subject unanimouſly agree: Whether it be, that the Spirit, by the Action of the Fire, is united to the fixed Subſtances, as ſome believe; or that, being of an exceeding ſubtle and volatile Nature, and extremely rarefied by the Heat, it imperceptibly makes its Eſcape through the Junctures of the Glaſſes, though ever ſo cloſely cemented; certain it is, that it was never yet obtained in this Manner.

EXPERIMENT II.

Ten Gallons of the WITHAM SPA, freſh from the Pump, were exhaled in an open

Veſſel by a gentle Heat: A yellowiſh brown Subſtance was left, like that obtained in the former Experiment. It weighed five Drams. It relented much in a moiſt Air: And Part of it being laid upon a red-hot Iron, gave a very ſmall, feint, blueiſh Flame, and emitted a Smell of Sulphur.

EXPERIMENT III.

To the *Reſiduum* of the laſt Experiment were put four Ounces of diſtill'd Rain-Water warm; they were briſkly ſtirr'd about, and after ſtanding ſome Time to ſettle, the Water, by gentle Inclination, was poured off into the Filtre. This was repeated five times more, and at laſt the Mixture was well ſtirred together, and, with the Earth contained in it, was now poured into the Filtre. The filtring Paper, being thoroughly dry'd before it was uſed, weighed exactly thirty-four Grains; and after theſe ſeveral Filtrations, being again well dry'd, with the Earth it contained, it weighed two hundred and ſix Grains.

By this Experiment, our Mineral Water appears to contain a ſaline and an earthy Part: In the Proportion of twelve Grains and four fifths of the former, and ſeventeen Grains one fifth of the latter, in a Gallon.

EXPERIMENT IV.

The ſeveral Filtrations of the laſt Experiment being mixed together, evaporated to a Pellicle, and ſet in a cool Place to chryſtallize, afforded Chryſtals of a Shape not unlike the *Laminæ* of *Venice Talc*, with very irregular Edges. This Salt taſted quick and bitteriſh in a low Degree; fermented neither with Acid nor Alcali; did not curdle Milk; diſſolved nearly in its own Weight of Water; and eaſily ran *per Deliquium* in a moiſt Air.

EXPERIMENT V.

Some of the Salt of the laſt Experiment being mixt with a proper Quantity of *Æthiopic Tartar*, and fuſed in a ſtrong Fire, became red; and in rectified Spirit of Wine gave a Tincture, from which by the Juice of Lemon a Sulphur was precipitated.

EXPERIMENT VI.

To another Parcel of the ſame Salt was added a Proportion of Salt of Tartar; and being intimately mixed, they were diſſolv'd together in diſtilled Water, which was filtred and evaporated to a Pellicle, and by ſtanding in a cool Place, afforded the true Chryſtals of Marine Salt.

From the two laſt Experiments we gather, that the Salt of Experiment the fourth, is really no more than a Sea-Salt joined to a ſulphureous Acid, in a juſt Proportion to make it neutral: And in Fact, Marine Salt and Spirit of Sulphur, may be ſo united by Art, as to anſwer the Appearance, and all the Trials of this Salt.

EXPERIMENT VII.

After the Chryſtals of Experiment the fourth were collected, the Remainder of the

Water was again evaporated to a due Degree, and ſet to ſhoot: When a few hexagonal priſmatick Chryſtals were formed, which appeared to be Nitre.

EXPERIMENT VIII.

The Remainder of the Water being again ſufficiently exhaled, yielded ſome cubic Chryſtals, which were Marine Salt.

EXPERIMENT IX.

Upon ſome of the Earth remaining in the Filtre, after the Extraction of all its Salts, and perfectly dry'd, were dropt ſome Drops of Oil of Vitriol: A violent Ebullition was immediately excited, and the Oil loſt its Acidity: The Event was much the ſame upon Trials with ſeveral other Acids.

This Experiment proves our Earth to be Alcaline.

EXPERIMENT X.

Into ſix Ounces of the WITHAM SPA, taken freſh from the Pump, were dropt twenty Drops of Solution of Silver, which inſtantly changed it of a Pearl White; but the Colour growing gradually deeper, the Liquor in leſs than half an Hour turned Black, and the next Day the Bottom and Sides of the Glaſs were lined with a black Powder. The ſame was repeated with Water that had been expoſed to the Air, and had loſt its Spirit: But here the Event was different; for the Water was only changed to a dirty White, and depoſited a Sediment of the ſame Colour.

It is agreed on by all the Writers upon Mineral Waters, that thoſe which turn Black with Solution of Silver, and depoſit a black Sediment, give thereby a manifeſt Proof of Sulphur. Thus we ſee, by this Experiment, that our Mineral Water is impregnated with Sulphur; but by the Reiteration of it with Water that had loſt its

Spirit, we find, the Sulphur, demonſtrated by this Proof, is Volatile.

EXPERIMENT XI.

We took ſome of the yellowiſh brown Sediment which our Mineral Water naturally depoſits when expoſed for ſome Time to the Air, and after drying, mixed it intimately with an equal Weight of Salt of Tartar: This Mixture we put into a covered Crucible, and gave it a briſk Fire in a Wind Furnace, till the Salt of Tartar was melted: The Maſs, which was now changed into a deep reddiſh Brown, was immediately turned into a warm Mortar and powdered: And by a ſhort Digeſtion, in a gentle Sand-heat, with rectified Spirit of Wine, it yielded a full and beautiful Tincture: From which, by the Affuſion of a little Juice of Lemon, the Sulphur was readily ſeparated.

This Experiment ſhows, there is a fixed Sulphur in the WITHAM SPA; the Particles of which muſt neceſſarily be exceeding fine and ſubtle, ſince they are inviſibly ſuſpended in a clear limpid Water.

EXPERIMENT XII.

We took two *Florence* Flaſks, one of which we filled up to the Neck with our Mineral Water taken freſh from the Pump, and the other with common Spring Water, with which was mixt an Ounce of a ſtrong filtred Infuſion of Galls: We then took a Siphon, and introducing one of its Legs into each Flaſk, we carefully and exactly cloſed up the Mouths of both, with a Cement that would prevent the moſt ſubtle Vapour from eſcaping: Next Day, the Mineral Spirit paſſing thro' the Siphon, had tinged the Water which was impregnated with the Galls, with feint purpliſh Streaks, which extended, from the End of the Siphon, a conſiderable Diſtance into the Flaſk.

It is obſervable, that the WITHAM SPA when freſh, is readily ting'd of a deep purple Colour, with a very ſmall Quantity of Galls; and that it is furniſhed with a Mineral Spirit, which it loſes in a ſhort Time when expoſed to the Air, as it does immediately under an exhauſted Receiver in an Air-Pump; after which its ſpecifick Gravity becomes greater. Now this Experiment demonſtrates to us what this Mineral Spirit is, and proves it to be no other than a volatile Iron. *N. B.* This Experiment muſt be made with all the Nicety and Exactneſs that is poſſible: For unleſs the Water be freſh, the Flaſks filled to a due Height, and the Cement cloſed with all imaginable Care, it will not ſucceed.

EXPERIMENT XIII.

To ſome of the yellowiſh brown Sediment beforementioned, well freed from its Salts and perfectly dry'd, was added double its Weight of the *black Flux*; which being thoroughly mixt with it, and fuſed together in a Wind Furnace, afforded a ſmall Portion of Iron.

Thus we find, that the WITHAM SPA carries in it, not only a volatile Iron, but a fix'd one too.

EXPERIMENT XIV.

We took a Pound of Filings of Iron, and four Ounces of Flowers of Sulphur, mixt them well, and with a ſufficient Quantity of common Spring Water, made them into the Conſiſtence of an Electuary: The Mixture was put into a ſmall Retort, and a Receiver adapted to it, which was filled with common Spring Water, ſtrongly impregnated with Galls; and the Retort fixt in ſuch a Manner, that the Mouth of it was immerſed in the Water contained in the Receiver; the Juncture being well luted with a wet Bladder. The Mixture in half an Hour's Time, began to heave and ſwell, and ſo great a Degree of Heat was excited, that the Hand could not be held upon the Retort without Pain. The Iron ſeemed penetrated and partly diſſolved, whilſt a ſubtle Vapour at the ſame Time was raiſed from the Mixture, and trickled down the Neck of the Retort into the Receiver. Next Morning we found the Air within the Glaſſes had been ſo much rarefied, as to crack the Retort four or five Inches in Length; notwithſtanding which, a very ſtrong Smell and Taſte of Sulphur and Iron were communicated to the Water in the Receiver, and a reddiſh black Powder was precipitated to the Bottom.

Thus we are taught by this Experiment, that a Mixture of Iron and Sulphur, will, even at Diſtance, communicate a Smell and Taſte to common Water; but much more will they do it, when the ſame Water is continually running through a large Bed of theſe Minerals in the Bowels of the Earth: In that Caſe, the Water acts in ſome Meaſure like a *Menſtruum*, and extracts, as it were by Infuſion, not the Smell and Taſte only, but the other Properties alſo and Virtues of the Mineral Subſtances immerſed in it.

CHAP. V.

Of the Chalybeate Principles of the WITHAM SPA.

FROM the foregoing Analyſis we find, that our WITHAM SPA is impregnated with two different Chalybeate Principles; the one, volatile and fugitive; the other, permanent and fixed: The former readily making its Eſcape, not only when the Water is expoſed to the Air, but even when bottled, corked and cemented; and is with extreme Difficulty retained: Whilſt the other, upon the abſence of this, is immediately precipitated to the Bottom.

But that we may the better comprehend the Nature and Excellency of theſe Principles, let us firſt examine the known Properties and Effects of Chalybeates in general; after which, deſcending to a more particular Enquiry into theſe, and comparing both, we ſhall the more eaſily aſcertain the Difference between them, and be better inſtructed where to give the Preference.

Chalybeates then, as they conſiſt of ponderous metalline Particles, by their Weight and the encreaſed *Momentum* they communicate to the Blood, cannot fail to quicken its Circulation, diſſolve its Tenacity, and remove Obſtructions: By their Sulphur, to exalt its Craſis, to encreaſe the *Craſſamentum*, and to ſheath its acrid Particles: And laſtly, by their auſtere and earthy Parts to ſtrengthen the relaxed Fibres, give a greater Tenſion to the Solids, and ſtrengthen the whole human Frame. It is indeed obſervable, that according to the State of the Humours in the *Primæ Viæ*, this corrugagating Power is ſometimes immediately exerted: And this ofteneſt happens, when Chalybeates are exhibited *in Solutis Principis*, or in a fluid Vehicle. Thus upon the firſt Admiſſion of Martial Remedies, eſpecially Chalybeate Waters, into the Stomach; if any groſs ſlimy Humours be lodged there or in the Bowels, they will be attenuated and diſſolved, ſo as either to be abſorbed by the Lacteals, and carried into the Courſe of the Circulation, or being no longer uſeful to the Habit, will be thrown out of the Body by Vomit or Stool. The peccant Humours being thus removed, the over relaxed and debilitated Fibres are anew braced up, and their Tone and former Strength reſtored: Nor is their ſalutary Power determined here; for being protruded with the Chyle into the Inteſtines, many Particles thereof find a ready Paſſage, thro' the Lacteals, into the Blood; where entering upon another Scene of Action, they by their Weight divide and attenuate its viſcid Humours; and having, by their Sulphur, deſtroy'd its Acrimony, and meliorated its Conſiſtence, they then exert their contractile Force, and reſtoring to the Solids their due Elaſticity, many dangerous and obſtinate Diſeaſes are happily removed thereby.

From this ſhort View of the Operations of Chalybeate Medicines in general, it is eaſy to conceive what particular Diſorders they are adapted to. We will inſtance only in one; the *Chloroſis* or *Febris Alba.* The Symptoms here are generally Sickneſs or Pain at Stomach; Loſs of Appetite; Shortneſs of Breath, attended with great Laſſitude upon the leaſt Motion; extreme Paleneſs; and Obſtruction of the *Menſes.* Theſe are the principal Symptoms incident to this Diſtemper. All of which proceed from a *Lentor* of the Fluids or a Relaxation of the Solids; but they are uſually both combined in this Diſeaſe. From too great a Laxity in the Fibres of the Stomach, proceed Indigeſtion, Sickneſs, and Loſs of Appetite; this Bowel not being able to perform as it ought, the Office by Nature aſſigned to it: Hence, from the too long Stay of crude, indigeſted Humours, and their Acrimony thence contracted, there muſt follow Pain; which may alſo happen from the capillary Veſſels in the Coats of the Stomach being obſtructed; whence the circulating Blood not finding a ready Paſſage there, muſt, in ſo nervous a Part, by the Diſtention of thoſe ſmall Tubes, produce a painful Senſation. The Shortneſs of Breath, Laſſitude, Paleneſs, and Retention of the Menſes, all proceed primarily from a Viſcidity of the Blood; which, by long Continuance, muſt of Neceſſity bring on likewiſe a Relaxation of the Solids. Theſe Symptoms are thus accounted for. And firſt, the Shortneſs of Breath: The viſcid Blood being, in the Courſe of the Circulation, thrown into the ſmall Ramifications of the Blood-Veſſels which are ſpread over the fine *Veſiculæ* in the Lungs, and being retarded there by its own Viſcidity and the Smallneſs of the Tubes, muſt neceſſarily diſtend them beyond their natural Capacities; whereby the *Veſiculæ* being compreſſed and ſtreightened, Reſpiration will be performed with greater Difficulty; or a Shortneſs of Breathing will be induced. As to the Laſſitude always complained of in this Caſe; it muſt be obſerved, that all Animal Motion is performed by the immediate Action of the Muſcles; and that the Muſcles themſelves are actuated by the animal Spirits derived to them, by the Nerves, from the Brain; and whatever will occaſion the Waſte of thoſe Spirits, or prevent their

Derivation through the Nerves, muſt bring on the Senſation of Laſſitude: Thus Labour, by waſting the Spirits, will cauſe Laſſitude; and a viſcid Blood, by dilating the Blood-Veſſels in the Brain, and compreſſing the Origins of the Nerves there, will prevent the Derivation of the Spirits through them, and conſequently produce the ſame effect. Paleneſs may be occaſion'd either by a Deficiency of the red globular Part of the Blood, which may happen from the Want of a due Elaſticity in the Solids, whereby the Blood is not ſufficiently elaborated and exalted; or from a Lentor therein, whereby, the red Part thereof not being ſufficiently fluid to permeate the fine Capillaries of the Skin, a Paleneſs muſt enſue. The *Menſes* likewiſe will be obſtructed in this Caſe, by the ſame Viſcidity in the Blood, which renders it incapable of diſcharging itſelf by the uterine Arteries: For, the Blood being ſtored with Particles too groſs to paſs through the capillary Veſſels, they will of courſe ſtop there, till the Quantity of them being encreaſed by connual Supplies, they will ſo obſtruct thoſe ſmall Canals, that the Paſſage of the Blood through them will, by degrees, become difficult, and at length, will be totally obſtructed; eſpecially as its Impulſe is, at the ſame time, ſo conſiderably leſſened by want of a due Elaſticity in the Solids: And this Obſtruction happening in the uterine Arteries, conſtitutes the laſt mentioned Symptom of this Diſeaſe.

Having thus deſcrib'd and accounted for the principal *Phænomena* of this Diſeaſe (for though in particular Perſons more, or different Symptoms, from thoſe here enumerated, may ſometimes ariſe; yet they may very juſtly be refer'd to the ſame general Heads; do certainly proceed from the ſame Cauſes; and with very little Variation, admit of the ſame Method of Cure) it will appear, that chalybeate Medicines are abundantly qualified to anſwer all Intentions in the Cure of it.

From what has been already advanced concerning the Nature and Operations of Chalybeates, it is obvious to remark, that they are not only an adequate Remedy in the Diſeaſe above-mentioned, but likewiſe that all others ariſing from too great a Viſcidity, Acrimony, or a depauperated State of the Fluids; or from a Relaxation, or Want of a due Tenſion and Elaſticity in the Solids, will be either entirely removed, or at leaſt greatly alleviated thereby: Unleſs ſome particular Symptoms, of which the ſkilful Phyſician is the only competent Judge, ſhould contraindicate their Uſe. And as moſt chronical Diſeaſes, incident to human Nature, owe their Riſe to ſome of theſe Diſorders in the Fluids or Solids, juſt now recited; ſo there are very few of them to which Chalybeates, under a juſt Regulation, will not prove beneficial. Thus in a Jaundice, when not attended with too great a Fever, they are very advantageouſly preſcribed; as likewiſe in a Dropſy, before the Lymphaticks are actually burſt: In Bodies debilitated by continual Fevers, or by Vomitings, Diarrhœas, Dyſenteries, or any other exorbitant Evacuation; in intermitting Fevers, or Agues, with, or after the Uſe of the *Peruvian* Bark; in ſome ſcorbutick Complaints; in the Hippo in Men, and hyſterick Diſorders in Women. Some Preparations of them are effectual in Hæmorrhages and Evacuations of ſeveral Kinds, others in Obſtructions (thus the immoderate Flux of the *Menſes* and their Obſtructions, both receive a Cure from different Preparations of Martial Remedies:) They are effectual alſo in the *Fluor Albus*; in ſome Species of Sterility; in the Rickets; in Indigeſtion; and laſtly, let me add, in ſuch hectick Fevers alſo as proceed from Relaxation, and where there is no Suſpicion, that any of the Viſcera are unſound. This Catalogue might yet be ſwell'd much higher, but theſe Inſtances at preſent ſhall ſuffice.

Theſe are the happy Effects of Chalybeates in general and of the ſeveral artificial Preparations thereof: But as Art is no more than Nature's Hand-Maid, it is not to be expected her Productions ſhould be ſo perfect and excellent as thoſe of her Miſtreſs: And accordingly we find, that the niceſt and moſt laboured Preparations of Iron, fall infinitely ſhort of thoſe which Nature herſelf affords. A pregnant Inſtance of this, we have now before us in the chalybeate Principles of our mineral Water. It is before obſerved, that there is a volatile and a fix'd Chalybeate contained therein. The firſt of theſe, from its extreme Readineſs to eſcape, and the great Difficulty of retaining it, muſt needs conſiſt of very ſubtile and minute Parts; and conſequently be fitted to penetrate the narroweſt and fineſt Veſſels in the human Body: But of this we ſhall ſpeak more largely in the next Chapter. The ſecond, and fix'd chalybeate Principle, which upon Evaporation of the Water and Extraction of its Salts, is found amongſt the ſmooth ochry Earth, is, whilſt the Water is freſh, and before the Avolation of its Spirit, inviſibly ſuſpended in it, and univerſally diffuſed through the whole Subſtance of it. So that, though it muſt indeed be allow'd, that this Principle does not equal in Subtlety the other which is volatile; yet we can hardly conceive any Tube in the human Body ſo exceeding ſmall, as to deny Entrance to Particles, whoſe Minuteneſs is ſuch, that being equally diſperſed through a perfectly limpid and tranſparent Liquor, they do not in the leaſt intercept the Rays of Light, or diminiſh its Tranſparency; eſpecially when theſe very Particles are puſh'd on by the natural Elaſticity of the Veſſels, and the Impulſe of ſo active a Principle as the volatile chalybeate.

Before we diſmiſs this Article, it will be proper to remark, that theſe chalybeate Principles jointly conſidered, are not only poſſeſſed of all the good Properties and Virtues peculiar to the generality of martial Remedies, but of infinitely more and greater: Inaſmuch as, by the extreme Subtlety of their Particles, they are enabled, as abovesaid, to penetrate into the minuteſt as well as the remoteſt Receſſes of the animal Frame; where they attenuate, diſlodge, and remove, any tough, viſcous and acrid Humours, that lying, as it were, out of the common Road of the Circulation, in the Extremities of the Fibrils, elude the Force of the beſt Remedies prepared by Art. And all this is performed without loading and oppreſſing the Stomach, or ſinking the Spirits, (as is but too frequently the Caſe, during the Adminiſtration of artificial Medicines) but on the contrary, theſe noble Products of Nature, while they exert their powerful Influence, raiſe the drooping Spirits, and give new Life and Vigour to the whole OEconomy.

Thus much may ſuffice at preſent concerning the chalybeate Principles of the WITHAM SPA: But as the Virtues of theſe may be encreaſed in Number as well as Efficacy, by the additional Power of other Ingredients, ſo when we have ſeparately conſider'd thoſe, we ſhall, in due Place, give an Account of the united Virtues of this admirable natural Compoſition, and point out its Uſe in the ſeveral Diſeaſes it may be applied to.

CHAP. VI.

Of the Mineral Spirit.

THAT there is an exceeding ſubtle and volatile Spirit in our mineral Water, cannot be queſtioned, if we conſider, Firſt, Its peculiar Freſhneſs before hinted at, together with its perfect Tranſparency when firſt taken from the Pump. Secondly, The Loſs of both theſe Qualities upon expoſing it to the Air. And Thirdly, The Difference of its ſpecifick Gravity when freſh, and after ſome Time ſtanding, as obſerved in Experiment the Twelfth. The agreeable freſh Taſte in the WITHAM SPA, is, no doubt, the Reſult of a due and perfect Mixture of all its Principles, from the Influence of its Spirit. For this ſubtle and almoſt incoercible Subſtance, pervades the whole Maſs of Water, divides, attenuates, and intimately mixes all its Parts; and forms, together with the reſt, one uniform, limpid, and ſeemingly homogeneous Fluid, pleaſant to the Taſte, agreeable to the Stomach, and of the greateſt Efficacy in curing various Diſeaſes. This penetrating Spirit, by its wonderful Activity, rarefies the Water, and is the Occaſion, that the ſpecifick Gravity thereof is leſs whilſt this remains, and greater after the Loſs of it. It breaks, ſubtilizes, and diſſolves the groſs ſulphureous Particles contained in the Water, in ſuch a manner, that they are inviſibly ſuſpended in it; till having, by its great Volatility, made its Eſcape, they then attract each other, and forming larger Cluſters, they intercept, in ſome meaſure, the Rays of Light, and give the Water a milky Hue; whilſt ſome of the lighter Particles emerging, form on the Surface a variegated Pellicle; and the more ponderous are, by their ſpecifick Gravity, carried to the Bottom. How this mineral Spirit is generated, is not eaſy to determine with Certainty: But the thirteenth Experiment ſeems to give us ſome Light into the Manner of it. For in that Experiment it is obſervable, that upon the intimate Mixture of the Water with the Filings of Iron and Sulphur, an Efferveſcence is excited, the Iron corroded and partly diſſolved, and a ſulphureous and chalybeate Taſte and Smell is communicated to the Water in the Receiver. From whence, I think, we may fairly infer thus much, *viz.* That the mineral Bed being, as we before hinted, replete both with Iron and Sulphur, any Spring of common Water that ſhall be conveyed into it, will produce ſimilar Effects to theſe mentioned in the Experiment: For immediately upon ſuch a Mixture, a Fermentation will ariſe, whereby ſome of the finer and more volatile Particles of our mineral Subſtances being by Colliſion, or otherwiſe, ſeparated from them, are mixed in the Water; and theſe conſtitute a volatile Subſtance like our mineral Spirit; whilſt ſome of the groſſer Parts of the Minerals being likewiſe diſſolved in the Water, impart their reſpective Properties alſo to it. Thus do we account for the Production of the WITHAM SPA, and of its mineral Spirit likewiſe, which in Conformity to what we have juſt now delivered, appears, by Experiment the Twelfth, to be a volatile Chalybeate.

But it may here perhaps be objected, that this *Hypotheſis* is inſufficient: For, ſuppoſing the Impregnation of the Water and the Generation of the Spirit, ſhould be allowed to have happened in the Manner here deſcribed, when firſt the Spring of common Water found its Paſſage into the mineral *Stratum*, yet that Effect could be of no long Duration, but muſt preſently ceaſe, as ſoon as the firſt Fermentation or Effervеſcence was over. This Objection would be of ſome Weight, if it were true, that the Water was to be percolated through a determinate Quantity only of the mineral Subſtances; for then, whatever Parts of the Iron or Sulphur were, by the firſt Fermentation, render'd commiſcible with the Water, they would ſoon be waſhed away, and conſequently the Water be deſtitute of any farther Impregnation: But this is not the Caſe here; for, as the Spring is conſtantly ſending forth a freſh Supply of Water, ſo the Minerals in the Bowels of the Earth are continually encreaſing, and if I may be allowed the Expreſſion, germinating afreſh: And theſe two Cauſes reciprocally acting, the mineral Water will ſtill be produced, and from the continued Fermentation thus perpetually carried on, will ever be impregnated with a mineral Spirit.

But to return: Our mineral chalybeate Spirit, by its great Activity, preſerves the other Principles of the SPA in their due Mixture and Perfections; and is to the reſt, as a Bond of Union, which is no ſooner loſt, but the other Principles immediately ſeparate themſelves, as was before obſerved, and falling in a browniſh Sediment to the Bottom, leave the Water quite vapid and uſeleſs. From the Manner of its Generation and the Principles it ariſes from, jointly conſider'd with its great Subtlety and Activity, we may eaſily form a Notion of its Virtues: Which are much the ſame with thoſe of Sulphur and Iron, only as this conſiſts of the fineſt Particles of both, it muſt neceſſarily poſſeſs the Virtues of both in the higheſt Degree. In a word, where the Spirits are drooping and languid, the Conſtitution debilitated and oppreſſed, nothing ſo ſurely gives freſh Vigour and Alacrity to the whole Man, as this volatile Subſtance. And in all Obſtructions of what kind ſoever, there is hardly a more powerful Remedy; for we can with Difficulty form a Notion of any, tho' ever ſo remote from the *Primæ Viæ*, or ſeated in the very ſmalleſt Tubes in the Body, that a Spirit ſo extremely ſubtle as this, ſhould not be able to reach them, and if not too inveterate, or rivetted as it were upon the Conſtitution, to remove them too.

CHAP. VII.

Of the Sulphur.

OUR mineral Water, as we find by the tenth and eleventh Experiments, is enriched with both a volatile and a fixed Sulphur; the Nature and Uſes of which, we are now to enquire into.

Sulphur is a mineral Subſtance, brittle, fuſible by a gentle Heat, but inſoluble (of itſelf) in Water. It conſiſts of fattiſh or oily Parts, join'd with ſome Acid, and a little very fixed Earth. This Mineral, as it is almoſt wholly volatile, is therefore penetrating, attenuating, reſolving; and, from its fixed Earth, deſiccative. It is likewiſe a good balſamick, pectoral, vulnerary and antiſcorbutick Medicine. By its penetrating active Parts, it inſinuates itſelf into the very inmoſt Receſſes of the human Frame; where, by its attenuating Power, it diſſolves the tenacious Humours, which, being lodg'd in the Extremities of the fine Blood-Veſſels, obſtruct them, and occaſion ſharp, rheumatick and ſcorbutick Pains; or by their long Stay there, contracting an Acrimony, corrode the tender Coats of the Veſſels, and thus cauſe filthy Eruptions, as Leproſy, Itch and other Defædations of the Skin. Theſe groſs Humours being once diſſolved, are, by the elaſtick Power of the Arteries, puſh'd forward in the Courſe of the Circulation, till they are at length thrown out of the Body by the proper excretory Ducts: But the full Effect of the Medicine is not terminated

minated here; for the greateſt Part of the offending Humours being thus removed, the Remainder, by the deſiccative Quality of the Sulphur, is eaſily dry'd up, and its ſmooth, balſamick, oily Particles then exerting their healing Power, eaſily reduce the wounded Veſſels to their priſtine healthy State. It is very eaſy to conceive, what great Benefits muſt accrue in many, if not moſt, chronical Diſeaſes, from a Medicine poſſeſſed of theſe valuable Qualities: Thus we find it uſeful in Conſumptions, Coughs, habitual Cholicks; in the *Hæmorrhoides* or Piles (in which it is ſo excellent as almoſt to deſerve the Name of a true Specifick;) in the Itch, Leproſy, Grubs, Pimples, Tetters, Ring-worms, Rheumatiſms, wandering Pains and ſcorbutick Eruptions, Ulcers, Corroſions of the Gums, Emaciating of the Body, &c. *Helmont* commends it as an antipeſtilential Medicine, and ſays it may be ſafely adminiſtred in inflammatory Caſes: And the famous *Lemery* is very copious in its Praiſes: "It is appropriated, *ſays he*, "to the Diſeaſes of the Breaſt and Lungs;

“ and is given in Coughs, Colds, Phthiſics, “ Wheezings, and Shortneſs of Breath: It “ alſo kills Worms, opens, cuts, reſiſts Putrefactions and Poiſons, and provokes “ Sweat. Outwardly applied, it reſolves all “ hard Tumours, cures corroding Tetters, “ Scabs, Itch, Scurf, and Morphew, and “ dries up old Sores and Ulcers.” It would be too tedious in this Place to enumerate all the different *Encomia* which Authors beſtow upon Sulphur: Suffice it here to obſerve, that all we have hitherto mentioned concerning it, is affirmed of the common groſs Sulphur only. A volatile Sulphur (ſuch as is contain’d in the WITHAM SPA) is not only endowed with all the admirable Properties of the other, which we have been now deſcribing; but, from the extreme Subtlety of its component Parts, muſt be capable of penetrating much farther in the human Syſtem, and conſequently, of producing much greater Effects. Nor will our mineral fix’d Sulphur deſcribed in Experiment the Eleventh, fall greatly ſhort of the volatile Sulphur in its Virtues; for tho’ the

Particles of the former are not ſo fine and ſubtle as the latter, yet as they are minute enough to be ſuſpended inviſibly in a clear limpid Water, they muſt be capable of entring the ſtreighteſt and ſmalleſt Veſſels in the Body; and conſequently of carrying their ſalutary Power much farther than the common Sulphur can poſſibly do.

It may here perhaps be objected, that we affirm too much concerning Sulphur; aſcribing to it Virtues far exceeding any that the moſt celebrated Medicine is poſſeſſed of: But they who are of this Opinion, would do well to conſider, that the moſt ſtupendous Effects produced in Phyſick, are frequently not owing to the Bulk of the Remedy, but generally proceed from the extreme Subtlety or Minuteneſs of its Parts: Thus the *Crocus Metallorum*, an *Antimonial* Medicine, imparts, to a very large Quantity of White-Wine, a ſtrong vomiting and purgative Quality, without any perceptible Diminution of its Subſtance; and the ſame may be affirmed of other Preparations of the *ſame Mineral*. The great Dr. *Boerhaave* likewiſe has ſhewn us, that ſo harmleſs, and almoſt inſipid a Liquor, as the White of an Egg, acquires, by Digeſtion only in a gentle Heat, ſuch an amazing Faculty, that ſo ſmall a Quantity thereof as half a Grain taken inwardly, will preſently cauſe moſt violent Nauſea, Vomiting, Eructations, Fever, and Diarrhœa. But as theſe Symptoms in either Caſe, could ariſe from no other Cauſe, than an extremely ſubtle and highly exalted Sulphur, we ought not at all to be ſurprized, that this active Principle, as in ſome Inſtances it is productive of the moſt miſchievous Accidents, ſo in others, it ſhould be capable of producing the moſt deſirable Effects. And in Fact, whoever reflects upon the ſurprizing Cures every Day perform'd by the ſulphurous mineral Waters, will be forced to acknowledge, that they ought ſolely to be aſcribed to the Activity and Subtlety of this Principle, and not to its Quantity, which, in Proportion to the Water, is generally exceeding ſmall.

CHAP. VIII.

Of the Salts.

THE firſt that offers itſelf to our View, as it is indeed the firſt we obtain by Chryſtallization, is the Neutral Salt with thin *Laminæ* and irregular Edges like *Venice Talc*, as mentioned in Experiment the IVth. This Salt, as before obſerved, is a Compoſition of marine Salt and Sulphur, and, as appears from the Vth and VIth Experiments, is eaſily reſolvable into its original Principles: From thoſe Principles therefore it derives its medicinal Virtues, which, to avoid needleſs Repetitions, we ſhall not account for here, but refer the Reader to the Deſcription of them elſewhere delivered; where he will find their peculiar Properties and Virtues, ſeparately and diſtinctly deſcrib'd.

The next is the Nitre; which is found but in ſmall Quantity in our mineral Water.

That this Nitre differs greatly from the Nitre of the Shops, is plain for many Reaſons. The common Nitre is produced from fat Earths, Pigeons Dung, old Rubbiſh, Lime-Walls, *&c.* expoſed for ſome Time to the Air; whereby the Salt, naturally contain'd in thoſe Subſtances, is converted into the common Nitre; which by the Affuſion of Water, and afterwards by Filtration, Evaporation, and Chryſtallization, appears in the Form we find it in the Shops. The Properties of this Nitre are, that its Chryſtals are of a priſmatick Figure with hexagonal Baſes: That it diſſolves by Fire more readily than other Salts, but with more Difficulty by Water or moiſt Air: That it affects the Palate with Coolneſs more than any other Salt. But the Nitre, of which we are here to treat, is, in many Particulars, different from this: It is indeed the true *Sal Terræ*, having received no Changes from the Air or otherwiſe; and may therefore be called natural Nitre, to diſtinguiſh it from the other, which is factitious. Its Chryſtals, like thoſe of the factitious, are hexagonal and priſmatick; but it diſſolves by Fire not ſo eaſily as that, and inſtead of burning away in Sparks and Flame, it forms itſelf into a Subſtance reſembling burnt Alum. It is of a bitteriſh Taſte and alcaline Nature; whereas the other, if not an Acid, is at leaſt a neutral Salt. It readily relents in moiſt Air, and is more eaſily diſſolvable in Water than the other. Its Properties are, to cool, incide, attenuate, deſtroy Acidities, and gently purge by Stool and Urine. Hence in Diſorders proceeding from the too great Heat, Viſcidity or Lentor in the Blood, or from the Redundancy of the Humours, this Salt may be uſed with great Advantage: As likewiſe in Acidities lurking in the firſt Paſſages, from improper Food or Indigeſtion; nor is it leſs effectual in ſome Diſorders of the urinary Canals, eſpecially where they are obſtructed by Sand or Gravel, or their Paſſages furr'd up by heavy mucous Humours. By its cooling Quality it is of Uſe in Hecticks, and in other inflammatory Diſpoſitions of the Blood, as Quinſies, Inflammations of the Tonſils, *&c.* as alſo in moſt Diſeaſes of the Breaſt, as Pleuriſies, Peripneumonies, Coughs, Aſthma's. By its inciding and attenuating Property, it is ſerviceable in all Caſes where the Humours are thick and viſcid: As in all Obſtructions in the Viſcera, and in other Parts of the Body; the Jaundice, Dropſy, Eryſipelas, and a Multitude of other Caſes, where the Intention is, to deſtroy the Viſcidity, without heating, or encreaſing the *Momentum* of the Blood. Being of an alcaline Nature, it deſtroys Acidities, cures the Heart-Burn, ſour Vomitings and Eructations; and being likewiſe diuretick, the frequent Uſe of it is very beneficial in nephritick Caſes, in which it carries off the *Arenulæ* of the Gravel, before they unite in larger Cluſters, and thus prevents the Stone. In Stranguries and Heat of Urine, it is of ſingular Uſe; for by paſſing off the *Serum* plentifully through the urinary Paſſages, the acrid Salts that occaſioned thoſe Diſorders, are diluted and waſhed away; and conſequently thoſe troubleſome Complaints removed. Theſe and many more are the Virtues of this natural Nitre ſingly exhibited; but what farther Excellencies it may acquire from its Mixture in the WITHAM SPA, or what it may impart to the reſt of the Principles therein contained, ſhall be enquired in its proper Place.

The Third in Order is the Marine Salt. This when cleanſed from its Impurities, is neither of an acid nor alcaline Nature, making no Efferveſcence with Spirit of Vitriol, or Oil of Tartar. Its Chryſtals are of a cubick Form. It changes not its Nature in the Fire, nor acquires any Sharpneſs by the moſt extreme Degree of Heat. It likewiſe paſſes entire and unchanged thro' all the Stages of the Circulation. And laſtly, is a great Enemy to Putrefaction, from which it preſerves all the Parts of Animals and Vegetables. Its Uſes in Medicine are chiefly, to incide viſcous Humours; to ſtimulate the Veſſels thro' which it paſſes; to promote their ſeveral Secretions, and to reſiſt Putrefaction. The judicious *Boerhaave*, whoſe exquiſite Skill in Chymiſtry none ever yet has equall'd, tells us, that "Sea-"Salt paſſes unaltered thro' all the Conduits and Strainers, all the Digeſtions and Circulations of the Body, whoſe vital Powers are inſufficient to deſtroy its Texture, or change its Nature; which is more than even Putrefaction itſelf, or a violent Degree of Heat can effect.——The antient Adepts, therefore, were well aware of what they did in ſaying, Gold and Sea-Salt are the moſt perfect, or indeſtructible Bodies in Nature.----Other Salts, as Tartar, Nitre, *&c.* may readily be changed into Alcalies; whilſt this conſtantly remains in full Poſſeſſion of its native Virtues. Its Uſe therefore ſeems to be, to preſerve the Bodies, thro' which it paſſes, from Corruption; and particularly the Human; it deterges its Veſſels, keeps the Fluids from running into Putrefaction, and prevents the Formation of ſtony Matter. Whence we have the Reaſon, why the Antients gave *Sal-Gem* in putrid Fevers; and how a Mixture of Sea-Salt and Sulphur came to be ſuch a favourite Medicine with *Hippocrates* in peſtilential Caſes; or where the Juices of the Body tended to Corruption. *Helmont* alſo employ'd the ſame

Salt, with Vinegar and Sulphur, in the Plague.——Sea-Salt will, in a great Meaſure, prevent the Generation of the Stone.---If Urine be mixed with Sea-Salt, Nitre, Vitriol, &c. the ſeveral Parcels will, in Time, depoſit a ſtony Matter; but that the leaſt to which Sea-Salt was added. From whence it ſhould ſeem, that if any Salt could prevent the Generation of the Stone, it muſt be Marine Salt.

From what has been ſaid, it appears, that whereſoever the Stomach and Bowels are loaded with heavy viſcous Humours; in all Caſes where the Circulation is languid and but ſlowly carried on; in all Diſtempers tending to, or depending upon Putrefaction, this Salt may be uſed to Advantage. By its pointed Particles, it muſt neceſſarily incide the viſcid Humours, as well as incite the Bowels, or other Veſſels where they are contained, to reject them: By theſe Properties it is, that Marine Salt is ſo effectual a Remedy for Worms, as it not only deſtroys thoſe troubleſome Inmates themſelves, but likewiſe ſcours off the viſcous Humours which is the *Pabulum* that ſupports them. In a beginning Dropſy or Jaundice, this Salt, by its ſtimulating Quality, excites the Solids to briſker Vibrations; by which means the Fluids which moved but ſlowly before, for want of a due Elaſticity in the circulating Veſſels, are puſhed more briſkly forward, whereby the beginning Stagnations in the Liver or lymphatick Veſſels are remedied, and conſequently the future Obſtructions of thoſe Parts prevented. Nor is it at all to be wondered at, that this Salt ſhould be capable of producing theſe Effects; for if we allow its Particles to be ſuch, as muſt, from their Form, ſtimulate the *Primæ Viæ*, which we find by Experience they do, it will follow, from the great Solubility of it, together with its unchangeable Quality before remarked, that this ſtimulating Power muſt be continued even thro' the minuteſt Canals in the Body. As to the Efficacy of Marine Salt in putrid and peſtilential Fevers, and its Excellency in preſerving from the Stone; the Reader is refer'd to what has been already ſaid concerning them by the celebrated Author lately quoted.

Theſe are the Salts obſervable in the WITHAM SPA; and theſe muſt all act according to the ſpecifick Properties peculiar to each, as far as their Quantity will allow; but this being ſmall, it is not to be expected they ſhould produce the full Effects before aſcribed to them. However as they are all of a detergent, inciſive, and attenuating Nature, and are aſſiſted by the volatile Principles in the Water, they penetrate even to the moſt remote Tubes in the human Body; and by the gentle *Stimulus* they give to the Veſſels in their Paſſage, as well as by their Power of inſinuating into and attenuating viſcid Humours, they greatly contribute to the removing of Obſtructions, and promote the ſeveral animal Secretions.

CHAP. IX.

Of the Alcaline Earth.

THE Alcaline Earth comes next to be conſidered, of which this Water carries a good Proportion. This Earth, as it is a fixt Alcali, agrees in Virtues with thoſe Medicines to which (whether they be ſtrictly animal Subſtances or not) Cuſtom has arbitrarily given the general Name of *Teſtacea*. The Properties of Medicines of this Tribe are, to make an Ebullition with Acids and to deſtroy them; to abſorb ſuperfluous Humours, or to blunt their Acrimony. It is true indeed, that the Stomach and Bowels are the principal, if not the only, Scene of their Action; and that, from the Groſſneſs of their Parts, even when prepared with the greateſt Care, it is ſcarcely poſſible they ſhould find Entrance into the narrow Mouths of the Lacteals: But it is alſo as true, that by their obtunding and deſtroying the acrimonious and acid Humours in the firſt Paſſages, many great and deſirable Effects are produced. For the Stomach being, as it were, the Kitchen where all the Aliment is prepared, and from whence it is afterwards diſtributed through the whole Body; any Peccancy of Humours there, if not timely remedied, muſt be attended with ſome notable Inconvenience to the animal Œconomy; and conſequently whatever has the Power to correct the Peccant Humours there, will generally cure the Diſtempers ariſing from them, or at leaſt will very much contribute towards it. Indeed it muſt be acknowledged, that in ſome ſcorbutick Complaints, as well as in ſome cutaneous Eruptions, which perhaps might owe their Original, or at leaſt their Encreaſe, to Indigeſtion or ſome noxious Humour in the Stomach or Bowels, yet a Cure is not to be expected from the *Teſtacea*; for the preſent Seat of the Diſtemper being at ſo great a diſtance from the *Primæ Viæ* (even in the Extremities of the Capillaries) 'tis not to be ſuppoſed the groſs Particles of theſe Medicines ſhould penetrate ſo far; unleſs ſome one amongſt them ſhould be found, whoſe Particles are ſo fine and ſubtile, as readily to enter the ſtreight Mouths of the Lacteals, and be carried with the circulating Fluids through the minuteſt Canals in the Human Body. However by deſtroying the Acrimony of the Juices in the Stomach and Bowels, a farther ſupply is effectually cut off from the afore-mentioned Diſeaſes, and in other Caſes many deſirable Advantages obtained; as is evident in the following Diſtempers, many of which are entirely removed, but all of them in general are relieved thereby. *viz.* Fevers from an acid Cauſe; acid Vomitings and Eructations; Heart-burn; Cholera Morbus; Cholick; Cough; Hectick Fever; Diarrhœa; Dyſentery; Strangury, or Heat of Urine; Scurvy; ſome cutaneous Diſorders; Rheumatiſm; *Fluor Albus*; moſt acute Diſeaſes of Infants, wherein theſe Medicines are ſo excellent, that ſcarce any thing of conſequence is to be accompliſhed without them. They are alſo recommended in obſtructed Perſpiration, where, by breathing out the obſtructed Matter, they are ſaid to remove or prevent the Miſchiefs ariſing from it. But as the *Teſtacea* are not properly poſſeſſed of a ſudorifick Quality, it is fit here to explain how they may, and often do, promote Perſpiration. In order to this, it will be alſo neceſſary to ſhew, how Perſpiration is obſtructed, and the uſual Conſequents thereupon. Now Perſpiration is obſtructed many different Ways: As by the ſudden Admiſſion of cold or damp Air; by acrimonious Humours vellicating and contracting the Fibres; and by any ſudden Shocks of Fear, Anger, Grief, Joy, Surprize: All which, by a violent Conſtriction of the cutaneous Pores, ſhut up the Paſſages of the perſpirable Matter, and prevent its Diſcharge by the proper Outlets: Perſpiration being thus obſtructed, too large a Quantity of the ſerous Part of the Blood will be retained in the Habit; whereby the Veſſels being over-charged, will not be able to puſh on the Circulation as they ought. If the Redundancy of the Humours chance to fall upon any particular Part, the Diſeaſes peculiar to that Part will be produced;

duced; thus fixing upon the Head or Brain, they bring on violent Head-Aches, Apoplexies, Palſies: If upon the Lungs, Cough, Aſthma, Peripneumony; upon the Muſcles inſtrumental to Deglutition, a ſore Throat, as 'tis called, or Quinzy: Upon the Pleura and Intercoſtal Muſcles, a Pluriſy, *&c.* But if the obſtructed Matter be generally diſperſed throughout the Habit, the Veſſels will be too much diſtended; whence their elaſtick Power being greatly impaired, the Humours will ſoon contract an Acrimony productive of a thouſand Miſchiefs: For this Acrimony, by vellicating the Fibres, will ſtill conſtringe the cutaneous Pores; whence the Malady will be perpetually encreaſing, and at length perhaps terminate in Fevers, Rheumatiſms, or Palſies. But the Acrimony of the Humours, as has been already ſhewn, being here the immediate Cauſe of the Retention of the perſpirable Matter, firſt by other Means obſtructed, it muſt follow, that whatever can obtund or deſtroy that Acrimony, muſt be preventive of the Miſchiefs that are derived from obſtructed Perſpiration; for the Bar being thus removed, the Conſtitution will exert its natural Forces to throw off, by the cutaneous Pores, whatever is offenſive to it. And the known Properties of the *Teſtacea* being, to correct or deſtroy Acrimony, they promote Perſpiration in this Caſe, as was ſaid, by Accident: That is, not by any inherent ſudorifick Quality of their own, but by removing the Obſtacle that obſtructed it.

Having thus ſhewn the Uſe of the *Teſtacea*, to which, as is abovesaid, the Virtues of an alcaline Earth are conformable, and it appearing from Experiments the Third and Ninth that ſuch an alcaline Earth is contained in the WITHAM SPA, it remains only to be obſerved, that, as this Earth is equally ſuſpended thro' the whole Body of the Water, in ſuch a manner as not in the leaſt to render it thick and muddy, but that on the contrary it is perfectly clear and tranſparent, it muſt follow, that its Particles are extremely fine and ſubtle; and conſequently, that as this exceeds all other *Teſtacea* in Fineneſs, it muſt neceſſarily excel them likewiſe in its Virtues: For the finer the Particles of any Medicine are, the more readily and in greater Quantity will it find a Paſſage into the Blood, and the greater will be its Excellency in curing Diſeaſes.

CHAP. X.

The Concluſion.

HAVING thus conſidered our component Principles apart, and ſeverally ſhown their reſpective Virtues and Effects, we ſhall find, by a ſhort Recollection of the whole, that the WITHAM SPA is a ſulphureous chalybeate Water, impregnated with a ſmall Quantity of Salts, but carrying in it a larger Proportion of an alcaline Earth: That its Virtues therefore, are not only conformable to thoſe of its ſeveral Ingredients, but may likewiſe, and do many of them, reſult from the Mixture and united Virtues of the whole. As a Chalybeate, it quickens the Circulation, attenuates the Blood, diſſolves viſcid Humours, opens Obſtructions; after which, by its auſtere and ſtyptick Quality, it ſtreightens the relaxed Fibres, recovers the loſt Tone of the Solids, and reſtores their due Elaſticity. As a ſulphureous Water, it is likewiſe attenuating, reſolving, deſiccative, balſamick, pectoral, vulnerary, and antiſcorbutick. From its Salts, it incides, ſtimulates, diſſolves ſizy Humours, promotes the ſeveral Secretions, and is, in particular, very diuretick. Its ſmooth and ſubtle alcaline Earth is abſorbent, deſtroys Acids, and blunts the Acrimony of ſharp Humours. And the mineral Spirit not only preſerves by its Activity the due Mixture of the ſeveral Ingredients in the Water, but likewiſe raiſes the animal Spirits, and diffuſes new Life and Vigour thro' the whole OEconomy. The Chalybeate, however, in our mineral Water, is not to be conſidered as a mere Chalybeate and nothing more; but as a Chalybeate prepared with Sulphur; whereby the Body of the Iron is more opened and ſubtilized, and conſequently enabled to penetrate farther into the Habit, than it could otherwiſe do. This Sulphur, which is in its own Nature heating, is allay'd and qualified by the cooling Property of the Nitre. The Nitre, which of itſelf is too ſoft to ſtimulate the Veſſels enough to fuſe the viſcid Humours, and duly to promote the Excretion of Urine, has a ſtimulating Power communicated to it by the Marine Salt. And the Acrimony of the Marine Salt is ſufficiently corrected by the alcaline Earth: Whilſt the Energy of the whole is enforced by the powerful Influence and Activity of the mineral Spirit. Thus do theſe ſeveral Principles conſpire in forming a moſt uſeful Compoſition; and from their Union reſults this moſt excellent Mineral Water; whoſe ſingular Virtues and Efficacy will render it beneficial in many, if not moſt, chronical Diſeaſes incident to Mankind.

CONTENTS.

CHAP. I.

OF the Town of WITHAM. *The Situation of the Mineral Spring. The Strata where it riſes.* p. 1.

CHAP. II.

Of the Mineral Subſtances, and their component Principles. p. 5.

CHAP. III.

Of the Mineral Water; and ſome extemporaneous Trials upon it. p. 7.

CHAP. IV.

The Analyſis of the WITHAM SPA. *Some Experiments relating to it: With ſome ſhort occaſional Remarks thereupon.* p. 8.

CHAP. V.

Of the Chalybeate Principles of the WITHAM SPA. p. 20.

CHAP. VI.

Of the Mineral Spirit. p. 32.

CHAP. VII.

Of the Sulphur. p. 37.

CHAP. VIII.

Of the Salts. p. 43.

CHAP. IX.

Of the Alcaline Earth. p. 52.

CHAP. X.

The Concluſion. p. 58.

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